

**IN THE CLAIMS**

We claim:

1. A method of cleaning a molybdenum mask having a series of metals deposited thereon, comprising:

    placing the molybdenum mask in a cleaning solution including

    hydrochloric acid; and

    removing the molybdenum mask from the cleaning solution after a predetermined period of time.

2. The method of claim 1, further comprising:

    agitating the cleaning solution at a predetermined agitation level for a predetermined period of time.

3. The method of claim 2, further comprising:

    putting the molybdenum mask in a container; and wherein

    placing the molybdenum mask in the cleaning solution includes placing the container in the cleaning solution.

4. The method of claim 3, further comprising:

    closing the container.

5. The method of claim 4, wherein:

    the cleaning solution is contained within a first vessel;

    the first vessel is contained within a second vessel; and

the second vessel further contains an aqueous solution surrounding the first vessel.

6. The method of claim 5, further comprising:  
covering the first vessel with a lid.
7. The method of claim 6, further comprising:  
drying the mask with nitrogen.
8. The method of claim 7, further comprising:  
washing the mask with de-ionized water.
9. The method of claim 8, wherein:  
the cleaning solution is a hydrochloric acid solution having an acid concentration of at least 5 percent.
10. The method of claim 9, wherein:  
the cleaning solution is a hydrochloric acid solution having an acid concentration of at least 15 percent.
11. The method of claim 10, wherein:  
the cleaning solution is a hydrochloric acid solution having an acid concentration of at least 25 percent and no more than 50 percent.

12. The method of claim 11, wherein:

the cleaning solution is a hydrochloric acid solution having an acid concentration of about 37 percent.

13. The method of claim 8, wherein:

the predetermined period of time is at least 5 minutes and no more than 300 minutes.

14. The method of claim 13, wherein:

the predetermined period of time is at least 10 minutes and no more than 100 minutes.

15. The method of claim 14, wherein:

the predetermined period of time is at least 15 minutes and no more than 40 minutes.

16. The method of claim 15, wherein:

the predetermined period of time is at least 25 minutes and no more than 30 minutes.

17. The method of claim 8, wherein:

the agitation level is quantified in terms of agitation frequency.

18. The method of claim 17, wherein:

the agitation frequency is between 18 kHz and 2 MHz.

19. The method of claim 18, wherein:

the agitation frequency is between 20 kHz and 1 MHz.

20. The method of claim 19, wherein:

the agitation frequency is between 20 kHz and 100 kHz.

21. The method of claim 20, wherein:

the agitation frequency is between 25 kHz and 50 kHz.

22. The method of claim 8, wherein:

the agitation level is quantified in terms of agitation power.

23. The method of claim 22, wherein:

the agitation power is between 1 W/gal and 100 W/gal.

24. The method of claim 23, wherein:

the agitation power is between 2 W/gal and 50 W/gal.

25. The method of claim 24, wherein:

the agitation power is between 5 W/gal and 40 W/gal.

26. The method of claim 25, wherein:

the agitation power is between 10 W/gal and 30 W/gal.

27. The method of claim 26, wherein:

the agitation power is between 20 W/gal and 30 W/gal.

28. The method of claim 27, wherein:

the agitation power is about 25 W/gal.

29. The method of claim 1, wherein:

the predetermined period of time is at least 5 hours and no more than 48 hours.

30. The method of claim 1, wherein:

the molybdenum mask has a set of through holes.

31. The method of claim 1, wherein:

the series of metals includes chrome, copper, gold and a lead/tin mixture.

32. A method of cleaning a mask, comprising:

placing the mask in a cleaning solution; and

agitating the cleaning solution at a predetermined agitation level for a

predetermined period of time.

33. The method of claim 32, further comprising:

putting the mask in a container; and wherein

placing the mask in the cleaning solution includes placing the container in

the cleaning solution.

34. The method of claim 33, further comprising:

closing the container.

35. The method of claim 34, further comprising:
  - receiving the mask.
36. The method of claim 32, wherein:
  - the mask is a molybdenum mask.
37. The method of claim 32, wherein:
  - the cleaning solution is a hydrochloric acid solution.
38. The method of claim 37, wherein:
  - the cleaning solution is contained within a first vessel;
  - the first vessel is contained within a second vessel; and
  - the second vessel further contains an aqueous solution surrounding the first vessel.
39. The method of claim 38, further comprising:
  - covering the first vessel with a lid.
40. The method of claim 37, further comprising:
  - drying the mask with nitrogen.
41. The method of claim 40, further comprising:
  - washing the mask with de-ionized water.

42. The method of claim 37, wherein:

the cleaning solution is a hydrochloric acid solution having an acid concentration of at least 5 percent.

43. The method of claim 42, wherein:

the cleaning solution is a hydrochloric acid solution having an acid concentration of at least 15 percent.

44. The method of claim 43, wherein:

the cleaning solution is a hydrochloric acid solution having an acid concentration of at least 25 percent and no more than 50 percent.

45. The method of claim 44, wherein:

the cleaning solution is a hydrochloric acid solution having an acid concentration of about 37 percent.

46. The method of claim 37, wherein:

the predetermined period of time is at least 5 minutes and no more than 300 minutes.

47. The method of claim 46, wherein:

the predetermined period of time is at least 10 minutes and no more than 100 minutes.

48. The method of claim 47, wherein:

the predetermined period of time is at least 15 minutes and no more than 40 minutes.

49. The method of claim 48, wherein:

the predetermined period of time is at least 25 minutes and no more than 30 minutes.

50. The method of claim 46, wherein:

the predetermined period of time is at least 10 minutes and no more than 100 minutes.

51. The method of claim 37, wherein:

the agitation level is quantified in terms of agitation frequency.

52. The method of claim 51, wherein:

the agitation frequency is between 18 kHz and 2 MHz.

53. The method of claim 52, wherein:

the agitation frequency is between 20 kHz and 1 MHz.

54. The method of claim 53, wherein:

the agitation frequency is between 20 kHz and 100 kHz.

55. The method of claim 54, wherein:

the agitation frequency is between 25 kHz and 50 kHz.

56. The method of claim 55, wherein:

the agitation frequency is between 25 kHz and 40 kHz.

57. The method of claim 37, wherein:

the agitation level is quantified in terms of agitation power.

58. The method of claim 57, wherein:

the agitation power is between 1 W/gal and 100 W/gal.

59. The method of claim 58, wherein:

the agitation power is between 2 W/gal and 50 W/gal.

60. The method of claim 59, wherein:

the agitation power is between 5 W/gal and 40 W/gal.

61. The method of claim 60, wherein:

the agitation power is between 10 W/gal and 30 W/gal.

62. The method of claim 61, wherein:

the agitation power is between 20 W/gal and 30 W/gal.

63. The method of claim 57, wherein:

the agitation power is about 25 W/gal.

64. The method of claim 37, wherein:

the container is made of Teflon®.

65. The method of claim 37, wherein:

the container is made of a material essentially inert with respect to hydrochloric acid.

66. The method of claim 37, wherein:

the container is made of high-density polyethylene.

67. The method of claim 37, wherein:

the method is performed within an environment having a temperature

between 20 °C and 70 °C.

68. The method of claim 67, wherein:

the method is performed within an environment having a temperature

between 20 °C and 50 °C.

69. The method of claim 68, wherein:

the method is performed within an environment having a temperature

between 25 °C and 40 °C.

70. The method of claim 68, wherein:

the method is performed within an environment having a temperature of

about 25 °C.

71. The method of claim 68, wherein:

the method is performed within an environment having a temperature of about 30 °C.

72. The method of claim 68, wherein:

the method is performed within an environment having a temperature of about 40 °C.

73. A method of cleaning a mask, comprising:

putting the mask in a container;

placing the container in a cleaning solution; and wherein

the cleaning solution is contained within a first vessel;

the first vessel is contained within a second vessel; and

the second vessel further contains an aqueous solution surrounding the

first vessel.

74. The method of claim 73, further comprising:

closing the container.

75. The method of claim 74, further comprising:

covering the first vessel with a lid.

76. The method of claim 75, further comprising:

washing the mask with de-ionized water.

77. The method of claim 76, further comprising:

drying the mask with nitrogen.

78. The method of claim 77, further comprising:

receiving the mask.

79. The method of claim 73, wherein:

the cleaning solution is a hydrochloric acid solution.

80. The method of claim 79, wherein:

the mask is a molybdenum mask.

81. The method of claim 75, further comprising:

agitating the cleaning solution.

82. An apparatus for cleaning masks, comprising:

a first vessel having an open top;

a second vessel having an open top, the second vessel containing the first

vessel; and

an agitator within the second vessel.

83. The apparatus of claim 82, further comprising:

an aqueous solution within the second vessel; and

a cleaning solution within the first vessel.

84. The apparatus of claim 83, further comprising:
  - a lid sized to cover the open top of the first vessel.
85. The apparatus of claim 83, further comprising:
  - a relatively inert container sized to hold a plurality of masks and sized to fit within the first vessel.
86. The apparatus of claim 85, wherein:
  - the container has a clamshell form.
87. The apparatus of claim 85, wherein:
  - the container has a container vessel with an open top and a container lid sized to cover the open top of the container vessel.
88. The apparatus of claim 83, wherein:
  - the cleaning solution is an acid.
89. The apparatus of claim 88, wherein:
  - the cleaning solution is hydrochloric acid.
90. The apparatus of claim 83, wherein:
  - the cleaning solution is a base.
91. The apparatus of claim 90, wherein:
  - the cleaning solution is sodium hydroxide.

92. An apparatus for cleaning masks, comprising:

- a first means for cleaning the masks;
- a second means for holding the masks;
- a third means for agitating the first means and the second means;
- a fourth means for containing the first means;
- a fifth means for surrounding the fourth means; and
- a sixth means for holding the fifth means and the third means.

93. A method of cleaning a molybdenum mask having a series of metals deposited thereon, comprising:

- placing the molybdenum mask in a cleaning solution; and
- removing the molybdenum mask from the cleaning solution after a predetermined period of time.

94. The method of claim 93, further comprising:

- agitating the cleaning solution at a predetermined agitation level for a predetermined period of time.

95. The method of claim 94, further comprising:

- putting the molybdenum mask in a container; and wherein
- placing the molybdenum mask in the cleaning solution includes placing the container in the cleaning solution.

96. The method of claim 95, further comprising:  
closing the container.

97. The method of claim 96, further comprising:  
receiving the mask.

98. The method of claim 93, wherein:  
the cleaning solution is a hydrochloric acid solution.

99. The method of claim 98, wherein:  
the cleaning solution is contained within a first vessel;  
the first vessel is contained within a second vessel; and  
the second vessel further contains an aqueous solution surrounding the  
first vessel.

100. The method of claim 99, further comprising:  
covering the first vessel with a lid.

101. The method of claim 100, further comprising:  
drying the mask with nitrogen.

102. The method of claim 101, further comprising:  
washing the mask with de-ionized water.

103. The method of claim 98, wherein:

the cleaning solution is a hydrochloric acid solution having an acid concentration of at least 5 percent.

104. The method of claim 93, wherein:

the series of metals includes chrome, copper, gold and a lead/tin mixture.

105. A method of cleaning a molybdenum mask having a series of metals including chrome, copper, gold and a lead/tin mixture deposited thereon, comprising:

placing the molybdenum mask in a cleaning solution; and  
removing the molybdenum mask from the cleaning solution after a predetermined period of time.

106. The method of claim 105, further comprising:

agitating the cleaning solution at a predetermined agitation level for a predetermined period of time.

107. The method of claim 106, further comprising:

putting the molybdenum mask in a container; and wherein  
placing the molybdenum mask in the cleaning solution includes placing the container in the cleaning solution.

108. The method of claim 107, further comprising:  
receiving the mask.

109. The method of claim 105, wherein:

the cleaning solution is a hydrochloric acid solution.

110. The method of claim 109, wherein:

the cleaning solution is contained within a first vessel;

the first vessel is contained within a second vessel; and

the second vessel further contains an aqueous solution surrounding the  
first vessel.

111. The method of claim 110, further comprising:

covering the first vessel with a lid.

112. The method of claim 111, further comprising:

drying the mask with nitrogen.

113. The method of claim 112, further comprising:

washing the mask with de-ionized water.

114. The method of claim 105, wherein:

the cleaning solution is a hydrochloric acid solution having an acid

concentration of at least 5 percent.

115. The method of claim 113, wherein:

the cleaning solution is a hydrochloric acid solution having an acid concentration of at

least 5 percent.